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EXAMINER	
SCHINDLER, DAVID M	

ART UNIT	PAPER NUMBER
2862	

DATE MAILED: 05/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H-A

Office Action Summary	Application No.	Applicant(s)	
	10/616,710	HOMAN ET AL.	
	Examiner	Art Unit	
	David Schindler	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38 and 40-43* is/are rejected.

7)☒ Claim(s) *39* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/26/04, 7/10/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Pages 11-15 have hand written numbers next to the formulas. This handwritten numbers should be removed.

It appears that the Z term designated by handwritten number 17 on page 15 has a subscript of TTL, and that this subscript is missing for the Z term in formula (12) on page 15.

Appropriate correction is required.

Claim Objections

1. Claims 1, 2, 3, 23, and 24 are objected to because of the following informalities:

Note: many claims use the term "adapted." This term should be changed or removed to allow the claims to be positively recited.

As to Claims 2, 3, 5, 11, 15, 16, and 17,

The above claims use the term "step" which appears to be a reference back to (a), (b), and (c) in claim 1, but claim 1 never uses this terminology. It is recommended to either change claim 1 to read "the steps comprising:" on line 4 of claim 1, or to remove the use of the word step.

As to Claim 2,

The phrase "the group" on line 2 lacks antecedent basis and it is recommended to instead use "a group."

As to Claim 3,

The phrase "the antenna" on line 2 lacks antecedent basis.

As to Claim 23,

The phrase "the group" on line 2 lacks antecedent basis.

As to Claim 24,

The phrase "said antenna" on line 2 lacks antecedent basis.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 2, 10, 18, 22, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhou (EP 0648342).

As to Claim 1,

Zhou discloses (a) disposing a test loop (14) about the electromagnetic logging tool (10) such that the axis of the tool and a plane on which the test loop lies form a tilt angle that is between about 0 and 90 degrees (Figure 3); (b) measuring a signal induced in one of said antennas (R1) when another of said antennas (T1) is energized ((Column 3, Lines 50-58) and (Column 4, Lines 1-2) and (Column 5, Lines 8-15)), the induced signal being affected by the test loop (Column 3, Lines 50-54) and (Column 6, Lines 39-40), and (c) determining a correction for the induced signal ((Column 7, Lines 53-58) and (Column 8, Lines 1-8)).

As to Claim 18,

Zhou discloses a plurality of antennas disposed on the logging tool (Figure 3) with at least one antenna (R1) having its axis at an angle with respect to the axis of the tool (10), each antenna adapted to receive ((R1) and (R2)) electromagnetic energy (Column 3, Lines 57-58), a test loop (14) adapted for disposal about the logging tool such that the axis of the tool and a plane on which the test loop lies form a tilt angle that is between about 0 and 90 degrees (Figure 3), and a processor (internal electronics module) adapted to calculate a correction for a signal induced in one of said antennas by another of said antennas ((Column 7, Lines 53-58) and (Column 8, Lines 1-15)), the induced signal being affected by the test loop (Column 7, Lines 54-58).

As to Claim 2,

Zhou discloses step (c) includes applying to the induced signal a correction consisting of a sonde error correction ((Column 7, Lines 53-58) and (Column 8, Lines 1-15)).

As to Claims 10 and 22,

Zhou discloses the at least one antenna (R2) having its axis at an angle comprises a transverse antenna (Figure 3).

As to Claim 23,

Zhou discloses the processor is adapted to apply to the induced signal a correction consisting of a sonde error correction ((Column 7, Lines 53-58) and (Column 8, Lines 1-15)).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 7, 11-14, 16, 17, 19, 26-29, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Bittar (6,476,609).

As to Claims 7 and 19,

Zhou does not disclose the tilt angle is 45 degrees.

Bittar discloses the tilt angle is 45 degrees (Column 14, Lines 38-41).

It would have been obvious at the time of the invention to modify Zhou to include the tilt angle is 45 degrees as taught by Bittar in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3)).

As to Claim 11,

Zhou does not disclose step (c) further including producing a corrected signal and comparing the corrected signal with a calculated signal.

Bittar discloses step (c) further including producing a corrected signal and comparing the corrected signal with a calculated signal ((Column 12, Lines 4-6) and (Column 12, Lines 34-44) and (Figure 8)).

It would have been obvious at the time of the invention to modify Zhou to include step (c) further including producing a corrected signal and comparing the corrected

signal with a calculated signal as taught by Bittar in order to have an error that is within an allowable error value (Column 12, Lines 41-43).

As to Claim 12,

Zhou does not disclose deriving a gain or phase factor by comparing the corrected signal with the calculated signal.

Bittar discloses producing a corrected signal and comparing the corrected signal with a calculated signal ((Column 12, Lines 4-6) and (Column 12, Lines 34-44) and (Figure 8)), but does not explicity disclose deriving a gain or phase factor by comparing the corrected signal with the calculated signal.

However, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Zhou to include derive a gain by comparing the corrected signal with the calculated signal given the above Bittar disclosure in order to use the gain to increase the signal strength of the corrected signal.

As to Claim 13,

Zhou does not disclose multiplying the corrected signal by gain or phase factors.

Bittar discloses producing a corrected signal and comparing the corrected signal with a calculated signal ((Column 12, Lines 4-6) and (Column 12, Lines 34-44) and (Figure 8)), but does not explicity disclose multiplying the corrected signal by gain or phase factors.

However, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Zhou to include multiplying the corrected signal by a gain

factor given the above Bittar disclosure in order to use the gain to increase the signal strength of the corrected signal.

As to Claim 26,

Zhou does not disclose the processor is adapted to produce a corrected signal and to compare the corrected signal with a calculated signal.

Bittar discloses the processor ((32) of Figure 2) is adapted to produce a corrected signal and to compare the corrected signal with a calculated signal ((Column 12, Lines 4-6) and (Column 12, Lines 34-44) and (Figure 8)).

It would have been obvious at the time of the invention to modify Zhou to include the processor is adapted to produce a corrected signal and to compare the corrected signal with a calculated signal as taught by Bittar in order to have an error that is within an allowable error value (Column 12, Lines 41-43).

As to Claim 27,

Zhou does not disclose the processor is adapted to derive a gain or phase factor by comparing the corrected signal with the calculated signal.

Bittar discloses producing a corrected signal and comparing the corrected signal with a calculated signal ((Column 12, Lines 4-6) and (Column 12, Lines 34-44) and (Figure 8)), but does not explicity disclose the processor is adapted to derive a gain or phase factor by comparing the corrected signal with the calculated signal.

However, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Zhou to include the processor is adapted to derive a gain factor by comparing the corrected signal with the calculated signal given the above

Bittar disclosure in order to use the gain to increase the signal strength of the corrected signal.

As to Claim 28,

Zhou does not disclose the processor is adapted to multiply the corrected signal by gain or phase factors.

Bittar discloses producing a corrected signal and comparing the corrected signal with a calculated signal ((Column 12, Lines 4-6) and (Column 12, Lines 34-44) and (Figure 8)), but does not explicity disclose the processor is adapted to multiply the corrected signal by gain or phase factors.

However, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Zhou to include the processor is adapted to multiply the corrected signal by a gain factors given the above Bittar disclosure in order to use the gain to increase the signal strength of the corrected signal.

As to Claims 14 and 29,

Zhou discloses the calculated signal (true amplitude-ratio) is based on a model including the electromagnetic logging tool and the test loop ((Figure 3) and (Figure 5) and (Column 3, Lines 50-58) and (Column 4, Lines 1-11) and (Column 8, Lines 6-15)).

As to Claim 16,

Zhou discloses disposing a test loop (14) about the electromagnetic logging tool (10) such that the axis of the test loop is concentric with an axis of receiver antennas ((R1) and (R2)) ((Figure 3) and (Column 9, Lines 14-16)),

Zhou does not disclose step (b) includes rotating the test loop about the axis of the tool.

Bittar discloses tilted receiver antennas tilted ((R1) and (R2) of Figure 2) on a logging tool (Figure 2).

It would have been obvious to modify Zhou to include tilted receiver antennas as taught by Bittar in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3)).

It is noted that by tilting the test loop to be concentric with the receiver antennas, the test loop is rotated about the axis of the tool. It would therefore have been obvious at the time of the invention to modify Zhou to include step (b) includes rotating the test loop about the axis of the tool given the above Bittar disclosure in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3) as found in Bittar).

As to Claim 17,

Zhou discloses disposing a test loop (14) about the electromagnetic logging tool (10) such that the axis of the test loop is concentric with an axis of receiver antennas ((R1) and (R2)) ((Figure 3) and (Column 9, Lines 14-16)),

Zhou does not disclose step (b) includes displacing the test loop off the axis of the tool.

Bittar discloses tilted receiver antennas tilted ((R1) and (R2) of Figure 2) on a logging tool (Figure 2).

It would have been obvious to modify Zhou to include tilted receiver antennas as taught by Bittar in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3)).

It is noted that by tilting the test loop to be concentric with the receiver antennas, the test loop is displaced off the axis of the tool. It would therefore have been obvious at the time of the invention to modify Zhou to include step (b) includes displacing the test loop off the axis of the tool given the above Bittar disclosure in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3) as found in Bittar).

As to Claim 32,

Zhou discloses disposing a test loop (14) about the electromagnetic logging tool (10) such that the axis of the test loop is concentric with an axis of receiver antennas ((R1) and (R2)) ((Figure 3) and (Column 9, Lines 14-16)),

Zhou does not disclose the test loop is adapted for rotation about the axis of the tool.

Bittar discloses tilted receiver antennas tilted ((R1) and (R2) of Figure 2) on a logging tool (Figure 2).

It would have been obvious to modify Zhou to include tilted receiver antennas as taught by Bittar in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3)).

It is noted that by tilting the test loop to be concentric with the receiver antennas, the test loop is rotated about the axis of the tool. It would therefore have been obvious

at the time of the invention to modify Zhou to include the test loop is adapted for rotation about the axis of the tool given the above Bittar disclosure in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3) as found in Bittar).

As to Claim 33,

Zhou discloses disposing a test loop (14) about the electromagnetic logging tool (10) such that the axis of the test loop is concentric with an axis of receiver antennas ((R1) and (R2)) ((Figure 3) and (Column 9, Lines 14-16)),

Zhou does not disclose the test loop is adapted for displacement off the axis of the tool.

Bittar discloses tilted receiver antennas tilted ((R1) and (R2) of Figure 2) on a logging tool (Figure 2).

It would have been obvious to modify Zhou to include tilted receiver antennas as taught by Bittar in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3)).

It is noted that by tilting the test loop to be concentric with the receiver antennas, the test loop is displaced off the axis of the tool. It would therefore have been obvious at the time of the invention to modify Zhou to include the test loop is adapted for displacement off the axis of the tool given the above Bittar disclosure in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3) as found in Bittar).

3. Claims 3, 4, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Zuschlag (2,519,094).

As to Claim 3,

Zhou discloses as explained above.

Zhou does not disclose step (c) includes taking another signal measurement at the antenna measured in step (b) without any effect associated with the test loop.

Zuschlag discloses step (c) includes taking another signal measurement at the antenna (8) measured in step (b) without any effect associated with the test loop (37) ((Column 4, Lines 66-75) and (Column 5, lines 1-15)).

It would have been obvious at the time of the invention to modify Zhou to include step (c) includes taking another signal measurement at the antenna measured in step (b) without any effect associated with the test loop as taught by Zuschlag in order to make geophysical observations (Column 4, Lines 50-52).

As to Claim 4,

Zhou does not disclose taking another signal measurement includes removing the test loop or opening a conductive loop on the test loop.

Zuschlag discloses taking another signal measurement includes opening a conductive loop on the test loop (37) (Column 5, lines 1-15).

It would have been obvious to modify Zhou to include taking another signal measurement includes opening a conductive loop on the test loop as taught by Zuschlag in order to make geophysical observations (Column 4, Lines 50-52).

As to Claim 25,

Zhou does not disclose the test loop includes a conductive loop adapted for selective opening or closing of the loop.

Zuschlag discloses the test loop (37) includes a conductive loop adapted for selective opening or closing of the loop (Column 5, lines 1-15).

It would have been obvious at the time of the invention to modify Zhou to include the test loop includes a conductive loop adapted for selective opening or closing of the loop as taught by Zuschlag in order to make geophysical observations (Column 4, Lines 50-52).

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Holladay, III et al. (6,534,985).

Zhou discloses as explained above.

Zhou discloses a test loop (14) about an electromagnetic logging tool (10) and repeating steps (b) to (c) (Column 8, Lines 10-12).

Zhou does not disclose altering a position of the test loop.

Holladay, III et al. discloses altering a position of the test loop (Cx) (Column 12, Lines 8-16).

It would have been obvious to modify Zhou to include altering a position of the test loop as taught by Holladay, III et al. in order to mount the test loop (Cx) at the optimum location (Column 12, Lines 12-16).

5. Claims 6, 8, 9, 20, 21, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Gao et al. (6,393,364).

As to Claim 6,

Zhou discloses as explained above.

Zhou does not disclose deriving calibration coefficients for at least one of the antennas.

Gao et al. discloses deriving calibration coefficients for at least one of the antennas ((Column 6, Lines 12-17) and (Column 8, Lines 17-20)).

It would have been obvious at the time of the invention to modify Zhou to include deriving calibration coefficients for at least one of the antennas as taught by Gao et al. in order to obtain a better approximation of the horizontal conductivity ((Column 5, Line 2) and (Column 8, Lines 19-20)).

As to Claims 8 and 20,

Zhou does not disclose at least one of the antennas includes a plurality of coils having mutually orthogonal axis.

Gao et al. discloses at least one of the antennas includes a plurality of coils ((Rx), (Ry), and (Rz)) having mutually orthogonal axis (Figure 1).

It would have been obvious at the time of the invention to modify Zhou to include at least one of the antennas includes a plurality of coils having mutually orthogonal axis as taught by Gao et al. in order to generate estimates of certain features of earth formations (Abstract, Lines 3-10).

As to Claims 9 and 21,

Zhou does not disclose at least one of the antennas includes a plurality of coils having non-parallel axes.

Gao et al. discloses at least one of the antennas includes a plurality of coils ((Rx), (Ry,) and (Rz)) having non-parallel axes (Figure 1).

It would have been obvious at the time of the invention to modify Zhou to include at least one of the antennas includes a plurality of coils having non-parallel axes as taught by Gao et al. in order to generate estimates of certain features of earth formations (Abstract, Lines 3-10).

As to Claim 30,

Zhou does not disclose the processor is adapted to derive calibration coefficients for at least one of the antennas.

Gao et al. discloses deriving calibration coefficients for at least one of the antennas ((Column 4, Last line) and (Column 5, Lines 1-3) and (Column 6, Lines 12-17) and (Column 8, Lines 17-20)).

Gao et al. does not explicitly state a processor is adapted to derive the calibration coefficients for at least one of the antennas. However, it would be obvious to a person of ordinary skill in the art at the time of the invention to use a processor to implement deriving calibration coefficients for at least one of the antennas given the above Gao et al. disclosure in order to reduce the amount of complex electronics used (as evidenced by Column 3, Lines 12-13).

It would therefore have been obvious at the time of the invention to modify Zhou to include the processor is adapted to derive calibration coefficients for at least one of

the antennas as taught by Gao et al. and the above combination in order to obtain a better approximation of the horizontal conductivity ((Column 5, Line 2) and (Column 8, Lines 19-20)).

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Bittar (6,476,609) and in further view of Twist (5,159,577).

Zhou in view of Bittar disclose as explained above.

Zhou in view of Bittar does not disclose step (c) includes determining a maximum or minimum value associated with the measured signal.

Twist discloses step (c) includes determining a maximum or minimum value associated with the measured signal (Column 4, Lines 32-49).

It would have been obvious at the time of the invention to modify Zhou in view of Bittar to include step (c) includes determining a maximum associated with the measured signal as taught by Twist in order to generate a correction signal to correct for the effects of eccentering of the detector signals (Column 4, Lines 59-61).

7. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Twist (5,159,577).

Zhou discloses as explained above.

Zhou does not disclose the calculation for the induced signal correction includes determining a maximum or minimum value associated with the induced signal.

Twist discloses the calculation for the induced signal correction includes

determining a maximum associated with the induced signal (Column 3, Lines 49-54) and (Column 4, Lines 32-49) and (Column 4, Lines 67-68) and (Column 5, Lines 1-7 / note: electromagnetic sensors) and (Column 14, Lines 21-28)).

It would have been obvious at the time of the invention to modify Zhou to include the calculation for the induced signal correction includes determining a maximum associated with the induced signal as taught by Twist in order to generate a correction signal to correct for the effects of eccentering of the detector signals (Column 4, Lines 59-61).

2. Claims 24, 34, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Bittar et al. (6,218,842).

As to Claim 24,

Zhou discloses as explained above

Zhou does not disclose the processor is adapted to calculate the signal correction using a signal induced at the antenna without any effect associated with the test loop.

Bittar et al. discloses the processor is adapted to calculate the signal correction using a signal induced at the antenna without any effect associated with the test loop ((Column 13, Lines 54-67) and (Column 14, Lines 1-10)).

It would have been obvious at the time of the invention to modify Zhou to include

the processor is adapted to calculate the signal correction using a signal induced at the antenna without any effect associated with the test loop as taught by Bittar et al. in order to calculate the attenuation factors (Column 14, Lines 5-6).

It is noted that Bittar et al. does not have a test loop.

As to Claim 34,

Zhou discloses a test loop (14) adapted for disposal about the logging tool (10) such that the axis of the tool and a plane on which the test loop lies form a tilt angle that is between about 0 and 90 degrees (Figure 3), a computer (internal electronics module) adapted to connect to the electromagnetic logging tool (Column 8, Lines 12-15), wherein the computer is adapted to perform: energizing a first antenna on the tool in the presence of the test loop ((Column 1, Lines 31-35) and (Column 7, Lines 51-58), measuring an induced signal at a second antenna on the tool (Column 1, Lines 31-35), and determining a correction for the induced signal ((Column 7, lines 51-58) and (Column 8, Lines 1-15).

Zhou does not disclose a computer adapted to process a program with instructions.

Bittar et al. discloses a computer (microprocessor) adapted to process a program with instructions to energize a first antenna (Tc) on the tool and to measure an induced signal at the second antenna (receivers) on the tool ((Column 14, Lines 53-64) and (Column 14, Lines 3-10) and (Figure 8B) and (Column 17, Lines 29-33)).

It would have been obvious at the time of the invention to modify Zhou to include a computer adapted to process a program with instructions as taught by Bittar et al. in

order to be able calculate the attenuation of the signals received by the receiver pair using a formula (Column 14, Lines 3-10).

As to Claim 37,

Zhou does not disclose determining the correction for the induced signal includes using a signal induced at the second antenna not affected by the test loop.

Bittar et al. discloses determining the correction for the induced signal includes using a signal induced at the second antenna not affected by the test loop ((Column 13, Lines 54-67) and (Column 14, Lines 1-10)).

It would have been obvious at the time of the invention to modify Zhou to include determining the correction for the induced signal includes using a signal induced at the second antenna not affected by the test loop as taught by Bittar et al. in order to calculate the attenuation factors (Column 14, Lines 5-6).

It is noted that Bittar et al. does not have a test loop.

3. Claims 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Bittar et al. (6,218,842) and in further view of Gao et al. (6,393,364).

As to Claim 35,

Zhou in view of Bittar et al. discloses as explained above.

Zhou in view of Bittar et al. does not disclose at least one of the antennas includes a plurality of coils having mutually orthogonal axes.

Gao et al. discloses at least one of the antennas includes a plurality of coils ((Rx), (Ry), and (Rz)) having mutually orthogonal axis (Figure 1).

It would have been obvious at the time of the invention to modify Zhou in view of Bittar et al. to include at least one of the antennas includes a plurality of coils having mutually orthogonal axis as taught by Gao et al. in order to generate estimates of certain features of earth formations (Abstract, Lines 3-10).

As to Claim 36,

Zhou in view of Bittar et al. does not disclose at least one of the antennas includes a plurality of coils having non-parallel axes.

Gao et al. discloses at least one of the antennas includes a plurality of coils ((Rx), (Ry,) and (Rz)) having non-parallel axes (Figure 1).

It would have been obvious at the time of the invention to modify Zhou in view of Bittar et al. to include at least one of the antennas includes a plurality of coils having non-parallel axes as taught by Gao et al. in order to generate estimates of certain features of earth formations (Abstract, Lines 3-10).

4. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Bittar et al. (6,218,842) and in further view of Zuschlag (2,519,094).

Zhou in view of Bittar et al. discloses as explained above.

Zhou in view of Bittar et al. does not disclose the test loop includes a conductive loop adapted for selective opening or closing of the loop.

Zuschlag discloses the test loop (37) includes a conductive loop adapted for selective opening or closing of the loop (Column 4, Lines 57-75) and (Column 5, lines 1-15)).

It would have been obvious to modify Zhou to include taking another signal measurement includes opening a conductive loop on the test loop as taught by Zuschlag in order to make geophysical observations (Column 4, Lines 50-52).

5. Claims 40, 42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Bittar et al. (6,218,842) and in further view of Bittar (6,476,609).

As to Claim 40,

Zhou in view of Bittar et al. discloses as explained above.

Zhou in view of Bittar et al. does not disclose the program including further instructions to determine a corrected signal and to compare the corrected signal with a calculated signal.

Bittar discloses the program including further instructions to determine a corrected signal and to compare the corrected signal with a calculated signal ((Column 8, Lines 9-10 / note: internal memory and microprocessor) and (Column 12, Lines 4-6) and (Column 12, Lines 34-44) and (Figures 2 and 8) and (Column 18, Lines 43-65)).

It would have been obvious at the time of the invention to modify Zhou in view of Bittar et al. to include the program including further instructions to determine a corrected

signal and to compare the corrected signal with a calculated signal as taught by Bittar in order to have an error that is within an allowable error value (Column 12, Lines 41-43).

It is noted that the microprocessor in Bittar is a digital microprocessor as evidenced by the analog-to-digital (A/D) converter of Figure 2, and therefore uses instructions.

As to Claim 42,

Zhou discloses disposing a test loop (14) about the electromagnetic logging tool (10) such that the axis of the test loop is concentric with an axis of receiver antennas ((R1) and (R2)) ((Figure 3) and (Column 9, Lines 14-16)),

Zhou in view of Bittar et al. do not disclose the test loop is adapted for rotation about the axis of the tool.

Bittar discloses tilted receiver antennas tilted ((R1) and (R2) of Figure 2) on a logging tool (Figure 2).

It would have been obvious to modify Zhou in view of Bittar et al. to include tilted receiver antennas as taught by Bittar in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3)).

It is noted that by tilting the test loop to be concentric with the receiver antennas, the test loop is rotated about the axis of the tool. It would therefore have been obvious at the time of the invention to modify Zhou in view of Bittar et al. to include the test loop is adapted for rotation about the axis of the tool given the above Bittar disclosure in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3) as found in Bittar).

As to Claim 43,

Zhou discloses disposing a test loop (14) about the electromagnetic logging tool (10) such that the axis of the test loop is concentric with an axis of receiver antennas ((R1) and (R2)) ((Figure 3) and (Column 9, Lines 14-16)),

Zhou in view of Bittar et al. do not disclose the test loop is adapted for displacement off the axis of the tool.

Bittar discloses tilted receiver antennas tilted ((R1) and (R2) of Figure 2) on a logging tool (Figure 2).

It would have been obvious to modify Zhou in view of Bittar et al. to include tilted receiver antennas as taught by Bittar in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3)).

It is noted that by tilting the test loop to be concentric with the receiver antennas, the test loop is displaced off the axis of the tool. It would therefore have been obvious at the time of the invention to modify Zhou in view of Bittar et al. to include the test loop is adapted for displacement off the axis of the tool given the above Bittar disclosure in order to enable a solution for the horizontal conductivity ((Column 11, Lines 12-16) and (Column 12, Lines 2-3) as found in Bittar).

6. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (EP 0648342) in view of Bittar et al. (6,218,842) and in further view of Twist (5,159,577).

Zhou in view of Bittar et al. discloses as explained above.

Zhou in view of Bittar et al. does not disclose determining the correction for the

induced signal includes determining a maximum or minimum value associated with the induced signal.

Twist discloses determining the correction for the induced signal includes determining a maximum value associated with the induced signal (Column 3, Lines 49-54) and (Column 4, Lines 32-49) and (Column 4, Lines 67-68) and (Column 5, Lines 1-7 / note: electromagnetic sensors) and (Column 14, Lines 21-28)).

It would have been obvious at the time of the invention to modify Zhou in view of Bittar et al. to include determining the correction for the induced signal includes determining a maximum value associated with the induced signal as taught by Twist in order to generate a correction signal to correct for the effects of eccentering of the detector signals (Column 4, Lines 59-61).

Allowable Subject Matter

7. Claim 39 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is an examiner's statement of reasons for allowance:

The primary reason for the allowance of claim 39 is the inclusion of determining the correction for the induced signal includes using a signal induced at the second antenna with the conductive loop opened. It is these features found in the claim, as they are claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Pat. Pub. No 2003/0038287 to Amini which discloses a logging tool for measuring resistivity having a three axis coil configuration.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Schindler whose telephone number is (571) 272-2112. The examiner can normally be reached on M-F (8:00 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DS

David Schindler

JAY PATIDAR
PRIMARY EXAMINER